

Efficiency vs Landau parameters

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Landau parameters

Reducing the detector gain should reduce the cluster size and therefore the number of overlapping clusters at high multiplicity.

What is the impact of changing the charge deposited on the strips on efficiency (vs centrality) ?

Changing landau parameters:

- Commit to `/mutoo_subsysreco`; code added to `MuonUnpackPisa.cxx`:
`mMutSlowSim_par→set_landau_parameters(scaling factor × landau nominal parameters)`
- Landau parameters changed in macro with
`set_landau_scaling_factor(int)`

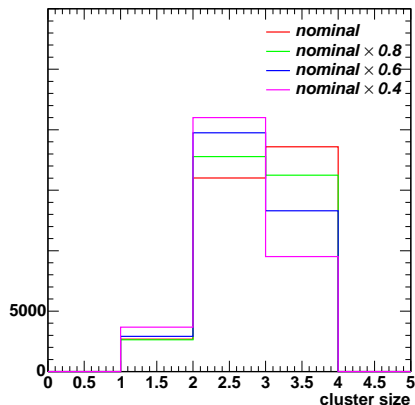
These slides show:

- The effect of lowering/highering the gain (scaling down/up landau parameters)
- Efficiencies embedding in double Hijing for the different configurations (nominal landau parameters $\times [1.2, 1, 0.8, 0.6, 0.4]$)

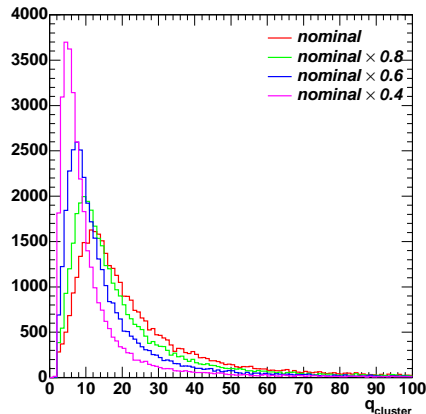
Cluster size pure MC

Cluster size MC vs landau config.

fired consecutive strips in a cluster

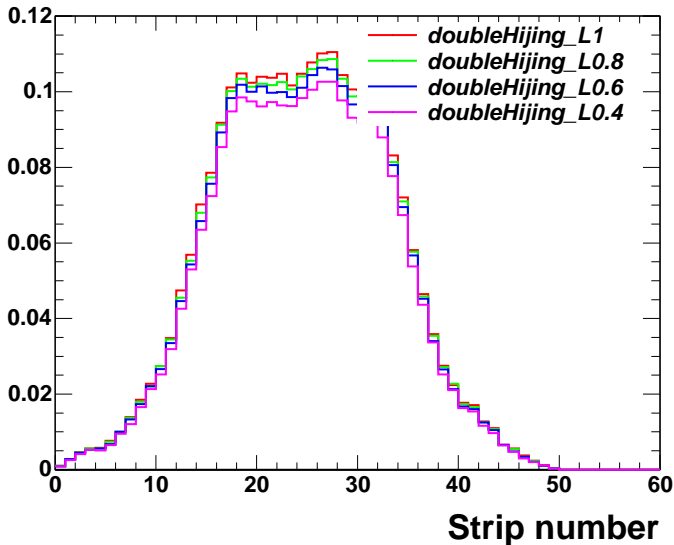


Cluster charge vs landau config.



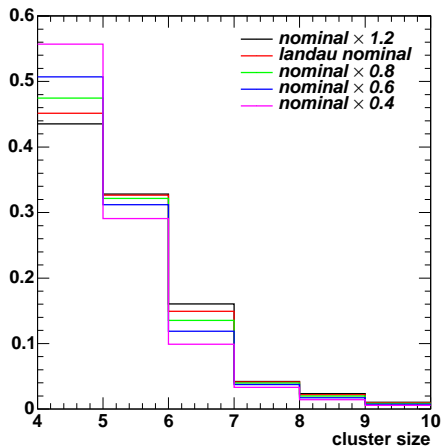
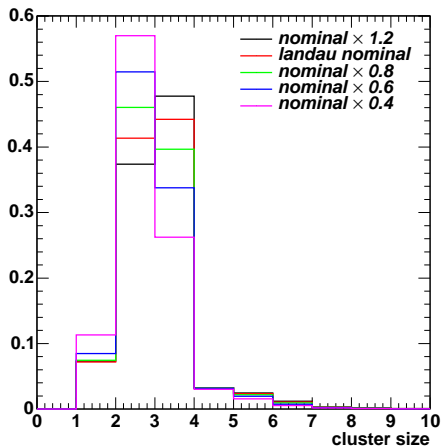
The mean of the clusters size and charges are lowered when reducing the landau parameters.

Occupancy: number of times strip fire per event



The occupancy is reduced along with the landau parameters, but difference is not too big: not losing a lot of hits.

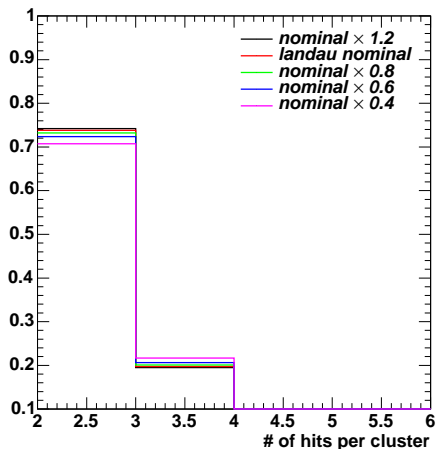
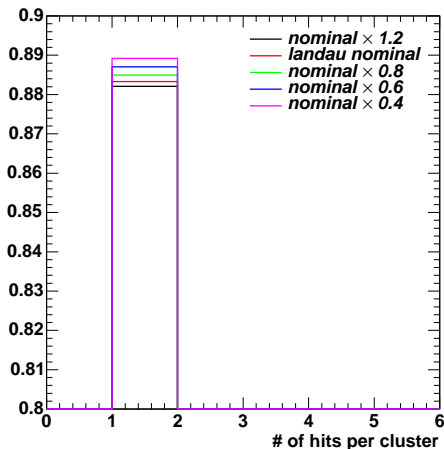
Cluster size when embedded in double Hijing



5 different configurations.

Clusters are smaller when reducing the Landau parameters.

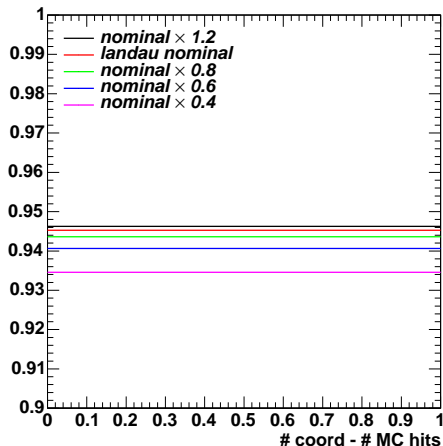
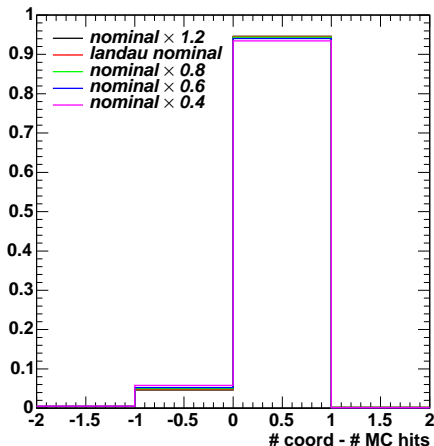
Variation of the number of MC hits per cluster



Number of MC hits (tracks) contribute to a cluster.
Clusters better separated, but the difference is small.

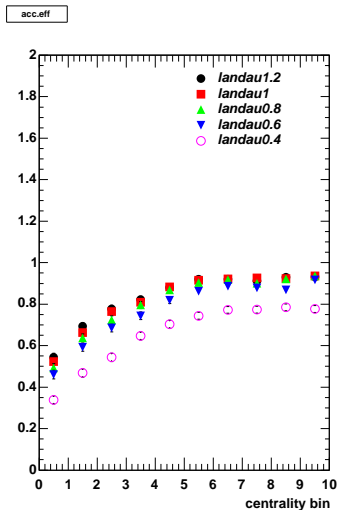
Number of hits vs number of coordinates

The coordinates are the reconstructed locations

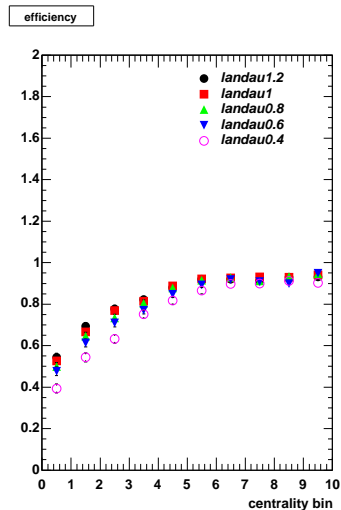


There are less clusters that have the same number of coordinates and hits: the fit cannot be better with less information.

Efficiency vs centrality



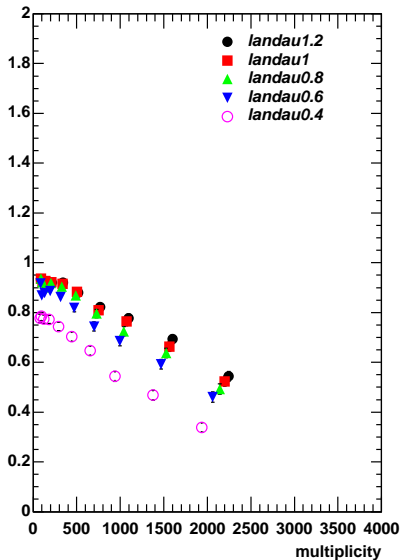
Embedding efficiency for each configuration normalized with the pur MC configuration where landau's parameters are nominal ($L=1$)



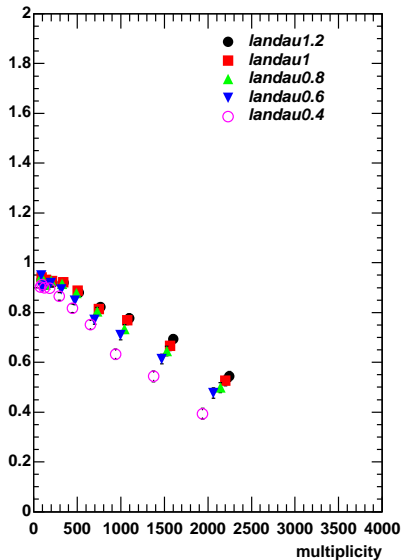
Normalized with the same landau configuration ($L=1$)
centrality 0 = central events

Efficiency vs multiplicity

acc.eff



efficiency



Conclusions

1. Smaller cluster size \Rightarrow efficiency reduction because of information loss.
2. Less overlap \Rightarrow improvement of the reconstruction efficiency for central events.

The study shows that:

- The efficiency loss when reducing cluster size (1.) is larger for central than peripheric events.
- The loss in efficiency when reducing the cluster size (1.) is dominant over any efficiency that is gain when there are less overlap (2.).

If the landau parameters are increased there is some gain in efficiency (which is coherent with the other statements).

The original hypothesis was that clusters were badly fitted because of overlap, but in fact: **it is because of a lack of information more than overlap.**

Suggestions:

- Look at configuration 1.4 and 1.6 to see when the balance changes.
- Change the cut to fit MC clusters > 3 also.
- Compare cluster size of MC vs RD.
- How does it affect the detector resolution ?